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THE IMPACT OF SEVERANCE TAXES ON THE ARKANSAS NATURAL GAS MARKET

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Abstract

The recent development of the Fayetteville Shale Play, an unconventional natural gas reservoir in Central and Eastern Arkansas, has created considerable opportunities for the state and its citizens as the industry has made substantial investment in the region. These developments have resulted in thousands of new jobs for Arkansans, billions of dollars in direct and indirect output, and millions in state and local tax revenues. One of the most visible issues in recent state news has been the controversy surrounding the severance tax levied by the state government on the extraction of natural gas. The question at hand has been whether or not to increase Arkansas's rate. The state has had the lowest severance tax incidence in the nation causing many to speak out for a raise in the tax rate to something comparable to surrounding states in the region. These demands caught the attention of Arkansas Governor Beebe who worked with natural gas companies to find a reasonable severance tax package including some discounts for shale play wells. The legislature shortly thereafter approved this increase to be enacted January 1, 2009.

The purpose of this study was to evaluate the state's reaction to these recent events and offer any additional recommendations that may enhance this set of decisions. A comparison of Arkansas, Kansas, Louisiana, Oklahoma, and Texas was conducted on multiple levels of economic conditions to evaluate the overall tax structure within each state. Outside research was also considered in forming these conclusions. After completing an extensive cross-state comparison and incorporating econometric research, it was determined that the Arkansas state legislature was justified in increasing the severance tax rate. However, the rationale for tax increases – specifically the reasoning that other states have higher severance tax rates – is somewhat flawed based on consideration of economic conditions, natural gas production numbers, and overall tax structures. A stronger rationale lies in additional research that suggests that an increase in liabilities for severance taxes yields minor changes in investment and drilling activity and potentially positive economic rewards.

Introduction

Costs of energy continue to soar and fears of exhausting natural resources endure as a legitimate concern. The search for alternative energy sources and less costly extraction is being pursued across the entire nation, as states and companies attempt to gain an advantage in the volatile energy market.

The state of Arkansas currently has a unique opportunity to

develop its previously meager natural gas market, since an unconventional gas reservoir called the Fayetteville Shale has recently been determined to be economical for gas extraction.

Although production of natural gas is fairly new to Arkansas, the state does have a modest history in natural gas extraction. According to the Arkansas Geological Society (2008), natural gas was first discovered in Fort Smith in 1887, and subsequently commercially developed in 1902 near Mansfield. As natural gas exploration continued, the 1923 state legislature passed Act 118 levying a tax for severing the natural resource from the state (hence, the name severance tax) at 2.5% of cash market value, according to Ernest Dumas of the Arkansas Times (2008). Since then, there have been fluctuations in the amount and manner of tax levies on natural gas, in part due to the involvement of prominent state families in the gas industry.

Shale deposits were first recognized as a legitimate source of natural gas as early as the 1980's, yet the concern had been the difficulty and expense of withdrawing the resource. As a result, shale gas had yet to be utilized as a supply of natural gas in the Arkansas market. However, as commodity prices continued to rise and the advancement of technology persisted, these concerns gradually began to shrink. Finally in 2004, Southwestern Energy Company announced successful drilling and production of gas from the shale. This demonstrated that the once inefficient reserve could perhaps be further developed to accommodate the growing demand for energy resources. Recently, other oil and gas companies have followed suit by seeking stake in the development of this emerging market and newly available supply, and the state has experienced significant investment as a direct consequence. The result has been the identification of what is called the Fayetteville Shale gas reservoir. This reservoir lies on the Arkansas side of the Arkoma Basin and ranges in thickness from 50 to 325 feet and ranges in depth from 1,500 to 6,500 feet. It runs across central and eastern Arkansas under multiple counties including Cleburne, Conway, Faulkner, Independence, Johnson, St. Francis, Prairie, Van Buren, White, and Woodruff.

With the development of the Fayetteville Shale reservoir, natural gas production has become a driving force in the Arkansas economy and the tax consequences of this production have been brought to the attention of the Arkansas legislature. Severance taxes are perhaps the most relevant and are generally levied upon non-renewable resources that are removed from the earth. In Arkansas, either the producer or the purchaser of natural resources is assessed the fee at the time of severance. Arkansas's severance tax rate has been among the lowest in

the country at three-tenths of one cent per thousand cubic feet generating only an approximate \$600,000 annually in general state revenue, according to the Arkansas Department of Finance and Administration (2008). Questions now arose regarding changes in the state's severance tax and details of how much to increase the rate, whether tax breaks or incentives would be offered, and where the revenue should be allocated after collection.

Sheffield Nelson, former gas company executive and former state chairman of the Republican Party, was among the first to recognize this opportunity and propose a plan to increase the state severance tax. Nelson prepared a ballot initiative for the November 2008 general election that would increase the severance tax rate to 7% of the market value of natural gas at the time of its extraction, as reported by John Brummett of the Arkansas News Bureau (2007). The revenue generated would be applied to higher education, highways, and local aid. Arkansas Attorney General, Dustin McDaniel, approved the initiative in February 2008, and Nelson quickly began to gather the approximately 62,000 required signatures by the July 7, 2008 ballot-qualifying deadline.

In addition to Nelson's proposal, Governor Mike Beebe diligently worked towards reaching an agreement with gas companies, according to Mark Hengel of ArkansasBusiness.com (2008). The initial pitch to gas companies and legislators was a smaller rate increase to be approved through a special session that Beebe would call only if he garnered a commitment of the necessary three-quarters majority to approve his plan. Revenues generated would be dedicated strictly to roads as an estimated \$19 billion will be necessary to repair state highways and bridges over the next 20 years. After a seeming standstill in early March, negotiations with the industry halted, and Beebe began the process to submit another ballot initiative to compete with Nelson's.

Within a few short weeks, however, the Governor announced that he had finally reached an agreement with the natural gas companies to increase the severance tax rate to 5% of market value with exemptions for new discovery, high-cost, and marginal gas wells. These exemptions lower the rate for "high-cost" wells, which currently account for about 38% of Arkansas wells, to 1.5% for the first three years and "marginal" wells, about 56% of Arkansas wells, to 1.25%. This leaves only about 5% of the state's wells to be taxed at the 5% base rate, although projections have been released that estimate approximately 12% would qualify under this rate by January 1, 2009, when the increase will go into effect. On March 31, 2008, a special session of the legislature was convened and the increase was approved three days later by the legislature and signed into law by the governor. New severance tax revenue will be allocated 95% to road improvements – of that, 70% is distributed to state highways, 15% each to cities and counties, and 5% to replace the current tax that goes into the general revenue fund. Nelson had said that he would pull his initiative from the ballot should the legislature pass the Governor's proposal, as some of his intention behind the measure was to encourage the gas industry to negotiate with Beebe. He

withdrew his bill immediately thereafter approval of Beebe's bill.

With this development of a new energy market in Arkansas and associated increases in severance tax revenues, there is a need for evaluation of the current severance tax structure in terms of generation of state revenue, encouragement of development, preservation of natural resources, and other indirect impacts. Comprehensive analysis of these issues is required if reliable recommendations are to be made concerning what is best for the emerging natural gas market and the state of Arkansas as a whole.

Some research has already been completed at the Center for Business and Economic Research (CBER) of the Sam M. Walton College of Business at the University of Arkansas. In a 2006 report addressing the economic impact of development from the Fayetteville Shale Play, projected economic outcomes included: state-wide economic activity of approximately \$5.5 billion; the creation of nearly 10,000 jobs; and the generation of approximately \$350 million in state and local tax revenues for the period from 2005-2008. In March of 2008, the CBER issued an update reporting that previous projections considerably underestimated the economic impact of natural gas exploitation and revising earlier projections. This update also reported data derived from a survey of natural gas companies. The survey instrument probed the impact of severance tax increases on economic development in many arenas.

Mitch Kunce (2003) and several other researchers from the University of Wyoming also completed an extensive econometric study evaluating how effective tax incentives are in encouraging drilling activity. In their study, reduced tax rates led to a substantial decrease in generation of state tax revenue, with mild changes in drilling and production. Kunce (2003) provides several reasons for these outcomes. First, he explains that cuts in severance tax rates offer no 'direct' incentive to increase drilling as these tax cuts are 'downstream' incentives offered at the end of the process. Thus, the benefits to this type of tax cut are only realized if the companies drill and are successful. He also makes the point that 'upstream' incentives may stimulate increased involvement more effectively as they are given at the beginning of the process. Second, because severance taxes at the state level are deductible from federal corporate income taxes, the actual impact here is only a semi-shift from state revenue to federal rather than a full decrease in total liabilities. It was concluded that increasing severance taxes is likely to generate revenue without significantly negatively impacting drilling and production activity.

The purpose of the study reported in this paper is to evaluate the state's reaction to changes in tax severance rates in order to develop additional recommendations that may improve state decision-making. A comparison of Arkansas, Kansas, Louisiana, Oklahoma, and Texas was conducted on multiple levels of economic conditions to evaluate the overall tax structure within each state. Outside research was also considered in forming these conclusions.

Methods

In order to conduct a theoretical analysis of the impact of the severance tax on the natural gas market in Arkansas, this study evaluated the conditions of four other states chosen for their similarities with Arkansas. Similarities included claims of state legislators regarding states' severance taxes, proximity to the state of Arkansas, natural gas production levels, and overall economic profile. The chosen states were Kansas, Louisiana, Oklahoma, and Texas, with most data collected by relevant federal or state agencies.

It is first important to examine the general economic status of each state to add context to any conclusions to be drawn after evaluation of tax structure. In this case, state populations, per capita real gross domestic product in dollars, per capita personal income in dollars, a cost of living index, and unemployment rates as a percentage are provided in Table 1 for the most recent periods for which data could be found. State population provides context for comparison and allows evaluation of the number of people directly impacted by each state government. Per capita gross domestic product (GDP) demonstrates the total market value of goods and services produced in the state per population. This allows GDP to be compared among states more fairly based on the number of people contributing to the state's economy. Per capita personal income represents the average income of state residents. Combining personal income with the cost of living is important in order to determine how much income is actually worth in that particular state. The cost of living index evaluates the cost of groceries, housing, utilities, healthcare, transportation, and a basket of miscellaneous goods as compared to the national average. Lower scores, considered superior, are then ranked nationally with a low score suggesting lowest cost to citizens of the state. Finally, unemployment data are provided to factor in the percentage of the adult population seeking employment and unable to find work. This group of economic indicators provides a fairly comprehensive representation of a state's overall economic well-being.

As another context for results, natural gas production data are useful in evaluating the responsiveness of the industry with respect to severance tax rates and incentives. In Table 2, 2006 Energy Information Administration data are provided for the number of producing gas wells, gross withdrawals in million cubic feet, marketed production in million cubic feet, and wellhead prices in dollars per thousand cubic feet. The number of wells drilled, gross withdrawals, and marketed production provide context for the amount of drilling and production activity within a state. Wellhead price represents the value of natural gas as it is withdrawn from the ground or the price obtained by the producer for sale at the well with a higher price being most advantageous to producers. These figures offer perspectives on the natural gas industry in each state evaluated.

Next, the overall tax structure of each state was evaluated by looking at the severance tax, corporate income tax, sales tax, property tax on gas wells and/or surface equipment, and overall state tax climate. These data are presented in Table 3.

The severance tax is the rate at which the state government taxes the extraction of natural gas from the ground within state borders. Corporate income tax represents the rate at which business profit is taxed. Sales tax takes into consideration the rate consumers pay when applicable goods and services are purchased within the state's borders. Additionally, some states impose a property tax at the state level in addition to the many local and county jurisdictions that do so. This is important to recognize in the present study, as gas wells and/or surface equipment often can be taxed under this category. Finally, this data set considers the overall state tax index for business in 2008 as calculated by the Tax Foundation (a lower ranking is superior). This index evaluates the total tax burden on companies operating within the state. Each of these tax structures contribute to the climate within which the natural gas industry operates in each state.

The remaining set of data gathered for this study focuses on exemptions to the severance tax and specific incentives offered to companies involved in drilling and production activities. Table 4 provides information for royalty deductibility, whether or not exemptions for the base rate are offered for new discovery wells, high cost wells, marginal or inactive wells, horizontal wells, deep wells, and other conditions impacting profitability. In many cases, companies must lease property to drill natural gas, and royalties are then paid to landowners. Some states offer deductions for these payments which can lead to a substantial decrease in tax liabilities. Additionally, each state has different definitions and qualifications for new discovery, high cost, marginal/inactive, and deep wells and varying breaks or incentives, which all have an impact on the cost to companies conducting drilling activities.

After consideration of all of the above data, a scorecard for the state of Arkansas was created employing the balanced scorecard method. As described by the Balanced Scorecard Institute (2008), this procedure has been used since the early 1900's to consider non-financial measures of business and government in an appraisal of their performance (seen Table 5). This method has become a recognizable research tool since Dr. Robert Kaplan and Dr. David Norton expanded the specific application for business efficiency in the 1990's. The advantages to using this method include its derivability and its flexibility in categories considered, allowing the researcher to tailor the scorecard to the particular subject being assessed. Due to the complexity and variation in types of data considered within this study, the balanced scorecard method is appropriate to build the theoretical conclusions drawn within this study.

The scorecard developed for this project was created to determine Arkansas' overall tax structure as compared to the four other evaluated states, including equally weighted categories for corporate income tax, sales tax, property tax, severance tax, and exemptions. In each category, Arkansas was evaluated with respect to the other states as having a higher burden (-), a similar or equivalent burden (0), or a lesser burden (+) on the natural gas industry considering both the

previous and new severance tax structure. Then the individual categories were compiled into a total burden index with respect to each state.

Results

General Economic Data

The first set of data provided in Table 1 describe the general economic situation in each state used for comparison. The first statistic evaluated is population. Arkansas has fewer residents than any other state except Kansas which has approximately 50,000 fewer people. Oklahoma is the next closest in population size, followed by Louisiana, and then Texas far above the others at the top. In terms of US ranking, the four closest states all fall within seven places of one another, providing adequate similarity for a comparison of this sort.

Next, with respect to per capita real gross domestic product, Arkansas is at the bottom of the group comparison, almost \$10,000 below the national average. Oklahoma is within \$200 of Arkansas' GDP and is ranked nationally only one state above Arkansas. There is a similar spread among the remaining states, with Texas deviating less than might be expected based on population size.

All five states are below the national average for per capita personal income. Arkansas is the lowest, a little more

than \$8000 below the national average. This figure is perhaps the strongest indicator of how the citizens of Arkansas fare in the national economy. Being among the bottom in the nation reflects poorly on the state's economy, although it is necessary to consider personal income in conjunction with the cost of living in the state to determine the significance of this difference.

When examining the cost of living index, there is a change in the trend of finding Arkansas towards the bottom in the nation and even the group for comparison here. Instead, Arkansas leads the nation in the top ten for getting the greatest value for the dollar, but in the middle for the five specific states being considered. This does account for some of the reasoning that Arkansas pulls up the rear in the nation for personal income, since residents can get more for their dollar. However, with respect to this comparison, the state still appears to be at the bottom for the sample group in income when considering this average price index.

The final economic indicator is state unemployment. Arkansas is the only state in this assessment that has a rate greater than the national unemployment rate and more than one percentage point higher than any of the other states in this sample. In general, Arkansas appears to suffer from worse economic conditions than any of the other states considered here – Kansas, Louisiana, Oklahoma, and Texas.

Table 1 – General Economic Data

	Population (2006) ¹	Per Capita Real GDP in \$ (2005) ²	Per Capital Personal Income in \$ (2006) ³	Cost of Living Index (2007) ⁴	Unemployment Rate in % (2007) ⁵
Arkansas	2,810,872 US Rank = 32	27,875 US Rank = 47	28,444 US Rank = 48	90.4 US Rank = 6	5.4
Kansas	2,764,075 US Rank = 33	33,298 US Rank = 34	34,744 US Rank = 22	92.0 US Rank = 8	4.1
Louisiana	4,287,768 US Rank = 25	30,798 US Rank = 39	31,369 US Rank = 40	95.0 US Rank = 19	3.8
Oklahoma	3,579,212 US Rank = 28	27,963 US Rank = 46	32,398 US Rank = 33	89.8 US Rank = 4	4.3
Texas	23,507,783 US Rank = 2	36,277 US Rank = 19	35,058 US Rank = 21	89.3 US Rank = 3	4.3
United States	301,139,947	36,842	36,629	100.0	4.6

¹US Census Bureau: State and County QuickFacts for 2006

²Bureau of Economic Analysis: Regional Economic Accounts for 2005

³Bureau of Economic Analysis: News Release for 2006

⁴Missouri Economic Research and Information Center: Cost of Living Index for 2007

⁵Bureau of Labor Statistics: Local Area Unemployment Statistics for 2007

Table 2 – Natural Gas Production Data (2006)

	# of Producing Gas Wells*	Gross Withdrawals (in mmcf)*	Marketed Production (in mmcf)*	Wellhead Prices (\$ per mcf)*
Arkansas	3,811	193,942	193,258	6.43
Kansas	19,713	372,029	371,044	5.61
Louisiana	17,459	1,378,238	1,361,119	6.93
Oklahoma	38,060	1,688,985	1,688,985	6.32
Texas	83,218	6,292,150	5,513,739	6.60

*Energy Information Administration: Natural Gas Summary Statistics by State for 2006

Natural Gas Production Data

Table 2 provides the current status of the natural gas industry in each state. Arkansas falls behind each of the comparison states, presumably reflecting the fact that it is a relative newcomer in the production of this resource. It is interesting to note, however, the marked differences between Kansas and Louisiana in the number of producing wells and withdrawals. Although Kansas leads Louisiana in gas wells by more than 2,000 individual wells, Louisiana overtakes production by nearly 100,000 million cubic feet. The next relevant piece of information is the wellhead price of natural gas by state. Arkansas is situated in the middle of the comparison states, although each state is within 60 cents of one another except for Kansas, which falls at the bottom by nearly a dollar difference.

Tax Structure Data

With the understanding of each of the state's economic and natural gas production environment, the next appropriate area of research is overall tax structure as it relates to companies in the natural gas industry. Table 3 outlines the details of each state's severance, corporate income, sales, and property taxes. Each of the five states tax the extraction of natural gas at levels varying from 3/10 of one cent per thousand cubic feet previously levied in Arkansas to 7.5% of market value in Texas. The five states also vary in the basis for taxation from production volume to market and gross value. Kansas actually taxes natural gas extraction at a rate of 8% but offsets this high rate with a 3.67% property tax credit. Arkansas indeed held the lowest rate prior to the March 2008 special legislative session which authorized an increase that will go into effect in January of 2009. This increase will raise the rate to 5% of market value and will move the severance tax rate in the middle of those

However, to accompany the range in the severance tax, corporate income tax rates also significantly vary from no tax at all in Texas to 8% in Louisiana's highest tax bracket. Arkansas appears to fall in the middle of the five state group. Also, the basis for levying the tax varies from a flat tax to two, five, or six income brackets with increasing rates. Louisiana differs slightly as it taxes a flat 4% with a 3.5% surtax for incomes greater than \$50,000.

The sales tax rate in each of the five states demonstrates less variability ranging only from 4% in Louisiana to 6.25% in Texas. Arkansas nears the top of this set at 6%, just below Texas. Kansas imposes a 5.3% sales tax and Oklahoma a 4.5% rate.

Finally, Arkansas, Kansas, and Louisiana each require state level property taxes which apply to gas wells and/or surface equipment for drilling. Oklahoma and Texas do not; however, local or counties may levy property rates in their respective jurisdictions in all five states.

An interesting index which does appear consistent with these findings is the Tax Foundation's State Business Tax Climate Index. Included in Table 3 for reference, Arkansas, Louisiana, and Kansas are all similarly ranked at 35, 33, and 32 respectively. Texas offers the most business-friendly tax climate at number 8 nationally, with Oklahoma ranked next at 19.

Exemptions and Incentives

Tax breaks for certain types of natural gas wells can result in a substantial decrease in tax liabilities for drilling and production companies in the industry and are thus important to consider when evaluating the tax structure and the impacts it has on natural gas activities within each state. The exemptions and breaks are presented in Table 4.

One break offered by Texas and Oklahoma only is a deduction for royalty payments to landowners. Each of the

Table 3 – Tax Structure Data						
	Severance Tax		Corporate Income Tax	Sales Tax	Property Tax (on Gas Wells and/or Surface Equipment)	State Business Tax Climate Index Ranking (2008) ⁶
Arkansas ¹	Old	\$.03/mcf (approx. 0.375% of market value)	1.0% > \$0 2.0 > 3K 3.0 > 6K 5.0 > 11K 6.0 > 25K 6.5 > 100K	6.0%	Yes (State-level)	35
	New	5% of market value				
Kansas ²	4.33% (8% of market value less 3.67% property tax credit)		4% > \$0 7.35 > 50K (3.35% surtax over \$50,000)	5.3%	Yes (State-level)	33
Louisiana ³	\$.269/mcf (approx. 3.3% of market value)		4.0% > \$0 5.0 > 25K 6.0 > 50K 7.0 > 100K 8.0 > 200K	4.0%	Yes (State-level)	32
Oklahoma ⁴	7% gross production & .95% excise tax		6.0% Flat	4.5%	No (Locally Only)	19
Texas ⁵	7.5% of market value		None	6.25%	No (Locally Only)	8

¹Arkansas Department of Finance and Administration: Tax Rates
²Kansas Department of Revenue: Tax Rates
³Louisiana Department of Revenue: Tax Rates
⁴Oklahoma Tax Commission: Tax Rates
⁵Texas Comptroller of Public Accounts: Tax Rates
⁶The Tax Foundation: Tax Data for 2008

five states also offer different rate discounts with respect to different well characteristics that increase costs to the company. For example, all states except for Texas cut the severance tax for new discovery wells. Also, Arkansas and Texas both offer breaks on high-cost wells which includes shale play wells. All five states discount marginal production or partially inactive wells. Louisiana and Oklahoma also decrease rates on horizontal and deep wells which are often in shale play areas. Texas exclusively offers an incentive to market previously flared or vented casinghead gas wells which increase the risk of repeat instances of decreased productivity in those wells. The decisions to offer discounts are similar in that each state decides to do so, but they differ in the instances in which the discounts are offered. Under Arkansas' previous severance tax structure, no exemptions, breaks, or incentives were offered but they were implemented as the rate was increased.

Arkansas Scorecard

After compilation of all of the data, a scorecard was created in Table 5 to compare the overall tax burden of the
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natural gas industry in each state as compared to Arkansas with respect to both the old and new severance tax packages. Under the old severance tax rate of 3/10 of one cent per thousand cubic feet with no exemptions or breaks, Arkansas had a similar tax burden to Kansas and Louisiana yet a greater burden than Oklahoma and Texas. Under the new severance tax structure, Arkansas maintained a similar tax burden to Kansas but surpassed Louisiana and remains higher than Oklahoma and Texas. The effects of the rate increase appear to be somewhat offset by the newly offered exemptions, but these still fail to compensate for other tax burdens on the industry.

Discussion

The Severance Tax Debate

In the Arkansas severance tax debate, there are two main camps – those who wish to increase the rate and those who do not. Each side has a strong faction with multiple arguments in support of their position. Both also seem to hold the best interest of the state as the foundation for their convictions. The cohorts clash, however, with respect to how to uphold the state's well-being.

Table 4 – Exemptions and Incentives

		Royalty Deductibility	New Discovery Wells	High-Cost Wells	Marginal/Inactive Wells	Horizontal Wells	Deep Wells	Other
AR ¹	Old	No	No	No	No	No	No	--
	New	No	Yes	Yes	Yes	No	No	--
Kansas ²		No	Yes	No	Yes	No	No	--
Louisiana ³		No	Yes	No	Yes	Yes	Yes	--
Oklahoma ⁴		Yes	Yes	No	Yes	Yes	Yes	--
Texas ⁵		Yes	No	Yes	Yes	No	No	Incentive to Market Previously Flared or Vented Casinghead Gas

¹Arkansas Department of Finance and Administration: Tax Rates
²Kansas Department of Revenue: Tax Rates
³Louisiana Department of Revenue: Tax Rates
⁴Oklahoma Tax Commission: Tax Rates
⁵Texas Comptroller of Public Accounts: Tax Rates

Table 5 – Arkansas Scorecard

		Kansas	Louisiana	Oklahoma	Texas
Corporate Income Tax		+	+	0	-
Sales Tax		-	-	-	0
Property Tax		0	0	-	-
Severance Tax	Old	+	+	+	+
	New	0	-	+	+
Exemptions	Old	-	-	-	-
	New	0	0	-	0
TOTAL BURDEN	Old	0	0	-	-
	New	0	-	-	-

The first group to consider is those advocating an increase in the rate. Proponents of this change include Governor Mike Beebe, Former Republican Party State Chairman Sheffield Nelson, other state leaders, and most state legislators. The support behind the policy is grounded in prioritizing increased fairness to state citizens. The higher rates of surrounding states are commonly cited as a reason to increase Arkansas's severance tax in order to charge a more regionally comparable price for the extraction of the state's natural gas. Additionally, the destruction of the state in terms of local roads and the environment are considered justification within this camp as well. The obvious advantage gained by increasing the severance tax is generating greater revenues for the state to remedy these concerns as well as fund other state initiatives.

On the other hand, critics of the new severance tax policy include the natural gas industry and select conservative state leaders and legislators. These opponents support the maintenance of the severance tax rate at the current level based on the increased cost to businesses and the corresponding negative impacts. One major concern is the decreased competitiveness of the state for investment when higher taxes are levied on natural gas producers. These increased costs will possibly increase rates to Arkansas consumers or reduce investment in the state. Consequences might also include decreased employment and collection from other state taxes.

One main group that tends to fall somewhere between the two sides of the issue are the royalty owners. While it appears to be obvious that this group would oppose a rate increase for fear of lost income, many recognize the need for road improvements in their areas. Thus these citizens generally advocate a compromise.

Analysis of Potential Consequences

Each side of the argument to increase the severance tax appears to have valid concerns. In order to determine the appropriate policy for the growing natural gas market, it is necessary to analyze all issues.

Based on the data gathered in this study and evaluation via the balanced scorecard, Arkansas appears to impose a similar tax burden as Kansas and a greater tax burden than Louisiana, Oklahoma, and Texas on the natural gas industry. Thus, increasing the severance tax may be risky policy with respect to the state's economy when simply comparing this small sample of states, particularly considering the fact that development of the natural gas industry is in its infancy in Arkansas. For example, Texas experienced growth similar to Arkansas with the Barnett Shale Play just a few years earlier. Due to the uniqueness and expense of shale play drilling, Texas offered a ten year exemption of the 7.5% of market value severance tax to natural gas wells drilled in the play area to encourage investment and activity. Thus, the general argument in support of increasing the severance tax to charge an equivalent price for the extraction of natural gas from the state as neighboring states seems to come up short.

Additionally, with recent announcements of fertile reservoirs in Louisiana and continued discoveries across the

region, companies are faced with expanded choices for where to invest. The overall tax burden of a state will certainly be considered when making these decisions, and companies will opt for the cheapest lands to further drilling activities. However, given finite resources, companies are restricted to areas with natural gas to drill regardless of increased discovery. It is obviously important to keep it profitable for companies to invest in exploration within the state. Many companies have already invested in the area; it is difficult to conclude that an increase in the severance tax will drive them completely out of the state, although decreasing investment is still possible.

Some of the argument against increasing the severance tax has stemmed from the fear that these new costs to companies would be passed on to the Arkansas consumer, who is already suffering when compared to the national average. However, there is little evidence to support this concern, in that the price of natural gas paid by consumers is determined by the global market based strictly on supply and demand and is not likely to be influenced by local factors such as tax rates. Even under this misconception, most of the natural gas produced in Arkansas is exported out of the state so any tax increase that would yield higher prices would, at worst, be passed on to consumers in other states. Arkansas, on the other hand, currently imports most of its supply. Therefore, under this argument, consumers already pay other states' severance taxes in their gas bills.

Based on the general economic well-being of Arkansas, the risk of damaging the state economy is amplified when one considers the possibility of inverse impact on prosperity brought into the area by natural gas companies' investment. Of particular concern is potential response to the implementation of a 5% severance tax rate by respondents in the CBER survey who claimed an average decrease in investment of 13%. This decrease in investment creates a corresponding decline of economic output by \$2.3 billion for the 2008-2012 period. It is important to note that this decline is simply an estimation based on reporting of natural gas companies who do have a clear incentive to keep tax rates low.

When applying Kuncze's (2003) research to this scenario, empirical evidence shows vast increases in tax revenue and miniscule drops in drilling activities when raising severance tax rates, even in the states used for comparison purposes. Based on these data, state legislatures should be discouraged from offering breaks or discounts. In fact, one of Kuncze's (2003) strongest points is a demonstrated shift in federal tax liabilities to state revenue. Because state severance taxes are deductible on federal corporate income taxes, companies pay these taxes within a similar dollar range regardless of the state rate. This is compelling evidence to increase the tax despite comparability to the states in this study. Given these findings, it is unlikely that Arkansas's economy will be damaged and/or mass investment will be discouraged.

Additional Economic Context

Another important aspect of the severance tax policy is allocation of the revenue generated. Although not directly related to the rate of the severance tax or exemptions and

incentives, the application of these tax dollars demonstrates the benefit to the state from revenues as compared to general economic output in Arkansas. It was originally proposed that the revenue be dedicated to education, and specifically to higher education or scholarships for in-state, low-income students. Arkansas has one of the lowest college attainment rates in the nation as personal income is meager on the national scale and the costs of a college degree continue to grow. However, Governor Beebe has pointed out that funding for education was increased during the last session and that it would be legislatively irresponsible to continue to ignore the growing need for highway funding. Additionally, bursary for education currently comes from general revenue. It was noted that, should the revenue from the severance tax not be allocated to highways, the \$19 billion anticipated to repair state roads and bridges would have to be pulled from general revenue. Essentially, it would just be a shift in budgeting, and possibly a risky one for education as it would be based solely on market prices.

It is also necessary to consider the concern of many Arkansans regarding the preservation of the Arkansas environment, especially being known as the 'natural state.' The damaging of local roads has been considered and remedied within the new structure. However, environmental issues, which include land based, surface, water, air, and noise contamination, are likely or even inevitable as a direct result of drilling activity. One of the greatest risks is pollution of the water supply in light of the millions of gallons of process water, drilling fluids, and return water that are injected into deep disposal wells below groundwater in saltwater formations. Additional study is necessary to determine the effects of these disposal practices, but the potential for catastrophic impact exists. On a less disastrous note, each well site requires a minimum of a 5 acre gravel pad that will remain for 25-40 years typically resulting in deforestation or clearing of prairie. Several states allocate a percentage of severance tax revenue to accommodate these concerns. The Arkansas legislature needs to make accommodations for these environmental impacts as well, and severance tax revenue would be an appropriate source from which to set aside funding to protect the state. This is particularly relevant as such taxes are collected from the same activities that have the potential to do harm.

Conclusions

Taking each of these pieces of evidence into consideration, the Arkansas state legislature was seemingly justified in increasing the severance tax in general. The plan passed in March of 2008 raises the rate to 5% and offers discounts for almost all wells in the state with marginal production or high cost to 1.25 or 1.5% respectively for up to three years. Projections anticipate generation of state revenues in the amount \$57 million in the first year and up to \$100 million annually by 2013.

If the legislature were to apply the recommendation of

Kunce (2003), these discounts would not be offered. However, conservative revenue projections under Sheffield Nelson's proposal of a 7% tax were similar to those of the governor's plan at \$60 million the first year, although they also ran up to \$100 million. It is possible that different production figures were used to calculate these two forecasts, especially considering Kunce's (2003) research suggesting that breaks significantly decrease tax revenues brought in by the state and the gap is large (between 1.25 and 7%). Additionally, these projections are also based on stable natural gas prices as the basis for the tax has switched from volume to market value. It was wise, based on Kunce's (2003) study, for the legislature to limit the breaks to three years rather than the 10 offered by Texas. This allows the state to gauge investment, drilling, and production as influenced by the change in severance tax policy. After consideration of new figures, it may be appropriate to reevaluate the tax package.

The Arkansas state legislature seems to have indeed made a reasonable adjustment to the natural gas severance tax structure by raising the rate, however, not necessarily for the right reason –i.e., to 'match' surrounding states' higher severance taxes. Instead, this policy alteration is appropriate in that econometric models based on empirical evidence demonstrate that increased rates yield minor changes in drilling activities and significant revenue generation. Although this same research warns of little benefit to offering exemptions and tax breaks, it is not unreasonable for the state to 'test' the rate increase with short term discounts. The downside is that it will be difficult to gather the necessary two-thirds support in the legislature to raise the tax again should Arkansas follow Kunce's (2003) model. Finally, perhaps the greatest shortcoming of the recent change is in its oversight in allocating some of the revenue generated from the severance tax to create a reserve fund to counteract any negative consequences to the environment. Overall, however, the state responded suitably to the Arkansas natural gas boom in the Fayetteville Shale Play region.

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Mentor Comments

Katherine Deck points to the immediate relevance of Tammy Lippert's work on severance taxes in Arkansas.

This letter is in reference to the work "The Impact of Severance Taxes on the Arkansas Natural Gas Market," an undergraduate research project by Ms. Tammy Lippert. I acted as her advisor on the project. Ms. Lippert came to me last fall with the desire to engage in practical, policy-oriented economic research for her Honor's Thesis. I suggested looking at the issues revolving around the development of the Fayetteville Shale, an unconventional reservoir of natural gas in central Arkansas, as the Center for Business and Economic Research was engaged in estimating its economic impact. Ms. Lippert decided to investigate the severance tax, which was very much in discussion at the time. The work compares the magnitude of the taxes on natural gas in Arkansas with those in surrounding states. The report acts as a summary of publicly available information that policy makers could use as a reference. The Arkansas legislature and governor's office used similar kinds of information when deciding to raise the severance tax last month.